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AUGMENTED REALITY OF STREET ART ROUTE FOR TOURISM, THAILAND

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Abstract: Augmented Reality (AR) has been identified as a powerful tool for enhacing the tourism experience. It enables the visualization of historical attractions, cultural narratives, and educational content, and fostering deeper engagement with destinations. For tourism engagement, the ancient city as Sonkhla in Thailand should be adoped AR for information services. This study aimed to investigate the proposed model and evaluate the tourist satisfaction in AR based on navigation technology, namely the AR StreetArt@Songkhla. The convenience sampling was the technique to collect data from 115 tourists using survey questionnaire. For analysis, the SmartPLS was used to investigate the proposed model and evaluate the tourist satisfaction on AR based on navigation technology. The findings illustrated the insight relationships in proposed model. It indicated that several factors on tourist satisfaction were not direct influences in every technology, especially AR based on navigation in street art. The results showed high level of tourist satisfaction in terms of perceived usefulness, perceived ease of use, perceived enjoyment, immersive experience, and tourist engagement. The AR StreetArt@Songkhla was successful development for tourists. The findings indicated that this technology can communicate culture and historical storytelling based on tourist's enjoyment during visiting street art. In addition, the proposed model revealed the direct and indirect influences on tourist satisfaction. Three perceptions did not have the direct influence on tourist satisfaction at the significant level of 0.05. However, perceived enjoyment have the indirect influence on tourist satisfaction through tourist engagment, while perception of usefulness and ease-of-use have the indirect influences on tourist satisfaction through immersieve experience. The paper provided in both theoretical and practical contributions. For theoritical contribution, the future researchers in tourism can develop their frameworks based on our proposed model, when they study in AR technology. In practical contributions, this study can help the AR developers to understand the processes of AR design and development. Additionally, the findings help the developers focusing on highlight factors in their AR design and development processes, in order to achieve tourist satisfaction, immersive experience, and tourist engagement.

Keywords: Augmented reality, culture, history, navigation, route, street art, tourism, Thailand

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INTRODUCTION

Augmented Reality (AR) is a transformative technology that overlays digital content on the real world, enhancing users' perception of their surroundings. AR blends the physical and digital worlds, allowing users to interact with both simultaneously. AR has moved beyond the realm of entertainment and gaming and is increasingly being applied across several sectors. Its versatility and the ability to deliver immersive experiences are driving innovation in several contexts such as education, healthcare, marketing, and advertising. In tourism and navigation, AR can enhance travel experience by providing real-time information on landmarks, museums, or historical sites. Tourists can use AR apps on their smartphones to view historical facts or interactive content while exploring attractions. In navigation, AR can assist tourists by displaying directions and points of interest overlaid on the physical world, improving the wayfinding experience (Hien & Trang, 2024; Lee et al., 2024, Lim et al., 2024, Zhang et al., 2024).

Songkhla is a big city in the southern Thailand. It is rich in historical, culture, and natural beauty. In recent years, it has become a vibrant hub for street arts because Songkhla is a Thai ancient city and has several storytelling of history and cultures. However, tourists are facing the problem of navigation and storytelling today. It is not convenient for them to find the nearby street art and receive the storytelling in a service. Most of them use Google Map for navigation to nearby street art, and use YouTube and Google Search Engine to get storytelling in each street art.

For solving the mentioned problem, this study developed AR StreetArt@Songkhla which is the smart technology to enhance the experience of tourists exploring Songkhla Street Art in Thailand. By combining geo-location with AR, tourists could receive guided tours that presented AR content dynamically adjusts based on the tourist's physical location, and

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enhancing the connection between the virtual and real world. The immersive content provided the significance of the art, information on the local artists, and how it tied to the country's broader cultural or historical narrative (Zhu et al., 2024). In addition, this AR used geolocation to guide tourists through specific routes, showcasing key areas where street art was located.

For successful development before launching the technology among tourists, it needed to understand the level of tourist satisfaction on AR StreetArt@Songkhla. Additionally, this study proposed a research model to understand factors on tourist satisfaction in the context of AR based on navigation technology.

LITERATURE REVIEWS

1. Augmented Reality (AR) in Tourism

Augmented Reality is a technology that overlays digital content in the real-world. AR blends virtual elements with the physical world such as 3D models, videos, texts, animations, audio, and images. Users offend viewed AR through devices like smartphones and tablets. In tourism, AR can provide additional information of historical and cultural landmarks, guide tourists through a city with digital navigation aids layered over the real landscape, and create interactive experience with art. Table 1 includes a variety of studies in several countries that investigate the role of AR in promoting, enhancing, and transforming the interaction between street art and tourism, focusing on urban environments, cultural storytelling, sustainability, and tourist engagement. Many previous studies indicated the integrating AR in tourism impacted tourist satisfactions (Chourasia et al., 2023: 42; Lee et al., 2024; Wang et al., 2024; Zhu et al., 2024). Furthermore, Chourasia et al. (2023) highlighted that AR significantly enhanced tourist engagement and knowledge acquisition, especially helping tourists understand the cultures of street art better (Yaakob et al., 2023). In addition, the location-based AR and AR navigation also enhanced tourist experiences (Moustafa et al., 2024; Omran et al., 2024; Zhang et al., 2024)

Table 1. Previous studies in tourism using AR

Authors	Summary	Context or Country
Chourasia et al. (2023)	Investigating the potential and effectiveness of augmented reality (AR) and virtual reality (VR) technologies to promote tourism in India.	Tourism Industry in India
Lee et al. (2024)	Examining the user experience of an augmented reality in AR heritage apps, and evaluation of user satisfaction and behavioral intentions.	Heritage Tourism In Hong Kong
Moustafa et al. (2024)	Influencing Augmented Reality Navigation on Human Perception: An In-depth Investigation.	Navigational Route in Egypt
Omran et al. (2024)	Illustration of systematic reviews and surveys of virtual reality and augmented reality applications on tourist engagement.	Tourist Engagement
Wang et al. (2024)	Virtual reality and augmented reality in artistic expression: A comprehensive study of innovative technologies	Artistic Field
Yaakob et al. (2023)	Enhancing tourist's experience in tourism by developing of augmented reality on Penang's Street art	Street Art in Malaysia
Zhang et al. (2024)	Exploring the impact of location-based augmented reality on tourists' spatial behavior, experience, and intention through a field experiment	Location-based AR in China
Zhu et al. (2024)	Interpreting the impact of augmented reality on heritage tourism: two empirical studies from World Heritage sites	Heritage Tourism in China

2. Tourist Satisfaction

Tourist satisfaction is a key to a successful tourist destination and the push factors influence tourist satisfaction such as enjoyment, new experiences, and cultural learning (Nguyen, 2021). The following literature reviews explored the variables from various studies related to tourist satisfaction or intention to use technology as presented in Table 2.

Table 2. Construct variable and its sources

No.	Variables	Sources
1	Perceived usefulness	Liu et al., 2023; Chouykaew et al., 2024; Hossain et al., 2024; Lim et al., 2024; Rasul et al., 2024; Soltani et al., 2024
2	Perceived ease of use	Lim et al., 2024; Prakhar et al., 2024; Rasul et al., 2024; Soltani et al., 2024; Xiong & Zhang, 2024
3	Perceived enjoyment	Liu et al. (2023); Huang et al., 2024; Lee et al., 2024; Rasul et al., 2024; Soltani et al., 2024; Zhang et al., 2024
4	Immersive experience	Peng et al., 2023; Afzal et al., 2024; Hien &Trang (2024); Lee et al., 2024; Soltani et al., 2024; Zhang et al., 2024
5	Tourist engagement	Peng et al., 2023; Moliner-Tena et al., 2024; Rasul et al., 2024; Soltani et al., 2024; Xiong & Zhang, 2024
6	Tourist satisfaction	Liu et al., 2023; Huang et al., 2024; Lee et al., 2024; Lim et al., 2024; Prakhar et al., 2024; Soltani et al., 2024; Zhang et al., 2024

Liu et al. (2023) and Soltani et al. (2024) found perceived usefulness was a factor of tourist satisfaction, while several previous studies found perceived ease of use was a factor of tourist satisfaction (Lim et al., 2024; Prakhar et al., 2024; Rasul et al., 2024; Xiong & Zhang, 2024). In the AR study, Lim et al. (2024) also indicated perceived usefulness and perceived ease of use influenced on tourist satisfaction. Furthermore, most previous studies found the positive impact of memorable experience on tourist satisfaction (Afzal et al., 2024; Chia et al., 2024; Hien et al., 2024; Zhang et al., 2024), likewise, enjoyment and fun (Huang et al., 2024; Lee et al., 2024; Lui et al., 2024; Soltani et al., 2024). Additionally, the tourist engagement may be the factors of tourist happiness or satisfaction in context of AR StreetArt@Songkhla (Peng et al., 2024; Soltani et al., 2024), even though Afzal et al. (2024) did not find direct influence on tourists' satisfaction on the smart tourism technology. Rasul et al. (2024) also did not find the relationship between perceived enjoyment and tourist

intention to visit heritage sites via tourist engagement. They illustrated the indirect influences of these two factors on tourist satisfaction. Based on literature reviews, all variables in this study were derived from previous studies as presented in Table 1 and Table 2. The proposed hypotheses were presented as follows:

H1: Perceived usefulness has a positive impact on tourist satisfaction.
H2: Perceived ease of use has a positive impact on tourist satisfaction.
H3: Perceived enjoyment has a positive impact on tourist satisfaction.
H4: Perceived usefulness has a positive impact on impressive experience.
H5: Perceived ease of use has a positive impact on perceived usefulness.
H6: Perceived ease of use has a positive impact on impressive experience.
H7: Perceived enjoyment has a positive impact on tourist engagement.
H8: Impressive experience has a positive impact on tourist satisfaction.
H9: Tourist engagement has a positive impact on tourist satisfaction

RESEARCH METHODOLOGY

1. AR Design and Development

In Figure 1, there were nine processes to design and develop AR of this study, namely "AR StreetArt@Songkhla". The first process began by researching and understanding the storytelling of Songkhla Street Art, Thailand. This process included gathering information about the art, history, and culture. Based on the storytelling, the second process prepared storyboards, scripts, and flow of the experiences. Third, the study evaluated the different AR cloud service providers such as ARLOOPA and Activive, and select the best one that was appropriate for project's requirements. This study selected ARLOOPA in Education Plan for schools and universities because of unlimited AR views, enough cloud storage (100 GB), navigated supports, and appropriate price. Forth, Adobe Photoshop was used to create characters and elements. The fifth process used Adobe Illustrator to combine visual elements, and then create animation and motion using Adobe Affter Effect in the sixth process. Seventh, all elements were integrated using Adobe Premiere Pro to enhance the storytelling aspect. The eighth process used Unity and Vuforia to create AR experience such as AR interactions, and markers for tracking. Finally, the uploading process was done to upload AR video to ARLOOPA and set up image markers.

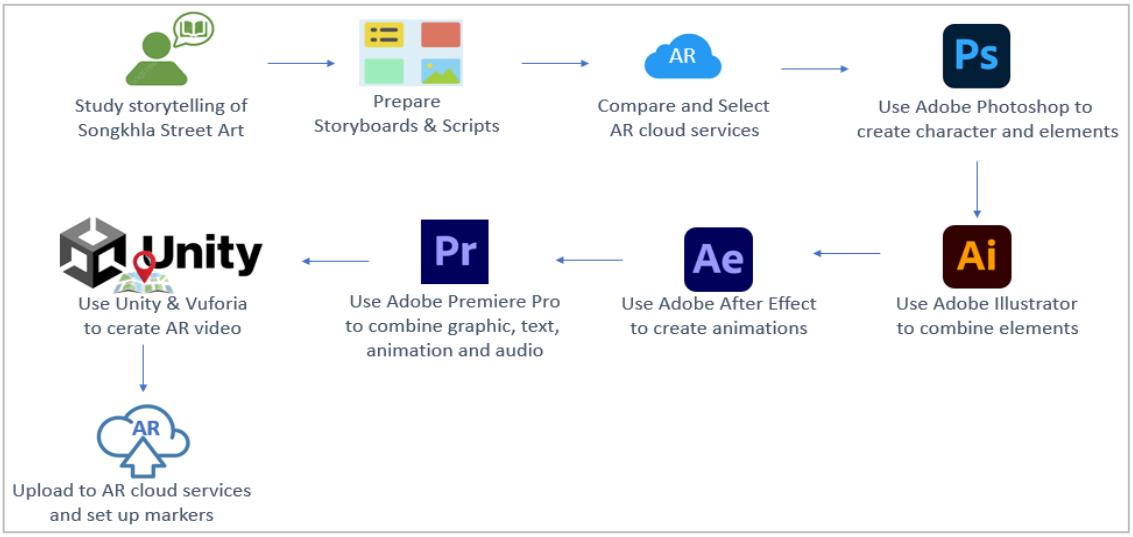

Figure 1. Processes of AR design and development (Source: personal original data)

For AR route development, the study selected 15 points (A-O) of street art in Songkhla, Thailand: (A) Shadow puppets in suits; (B) Grandparents sitting in front of the house; (C) Old man holding salted mackerel in front of the door; (D) Traditional cart coffee shop; (E) Thai fishing boats of the south; (F) Chinese opera actress; (G) Aunt Pranee's steamed dumplings; (H) Coffee shop; (I) Children of three nationalities; (J) Budu soup and shrimp crackers shop; (K) Stir-fried noodles for fortune; (L) Sidecar or Lor Lee; (M) Khor Noo & Khor Maew; (N) Ships and planes from World War II; and (O) Ancient city wall. Figure 2 showed the route of AR StreetArt@Songkhla and nearby attractions.

Figure 3 demonstrated the usage processes of AR StreetArt@Songkhla. First, tourists must install ARLOOPA application on their mobile phone before using this technology. During travel, tourists can scan the specific mural or artwork at Songkhla Street Art using ARLOOPA app's scanner feature. As the app processes, tourists should wait until the red circular progress bar displays 100% as presented in Figure 3 (a). Next, the virtual world added a layer of interaction, turning the static mural into a more engagement experience by combining the physical and digital elements.

In the virtual world, the AR elements consisted of text, image, audio, video, and animation as the example screen in Figure 3 (b). After the storytelling ending, the app provided interactive buttons such as "Go to I" and "Go to K" as presented in Figure 3 (c). These buttons could represent navigational features, allowing the user to explore nearby AR locations or murals connected through the app. It highlights the possibility of integrating AR for guided tours, suggesting other murals or points of interest in the Songkhla Street Art. Finally, the app offered navigational features

through Google Map as Presented in Figure 3 (d). The map highlights where the tourist is and where additional AR murals can be discovered, enhancing the exploration experience.

Figure 2. Route map of AR StreetArt@Songkhla (Source: personal original data)

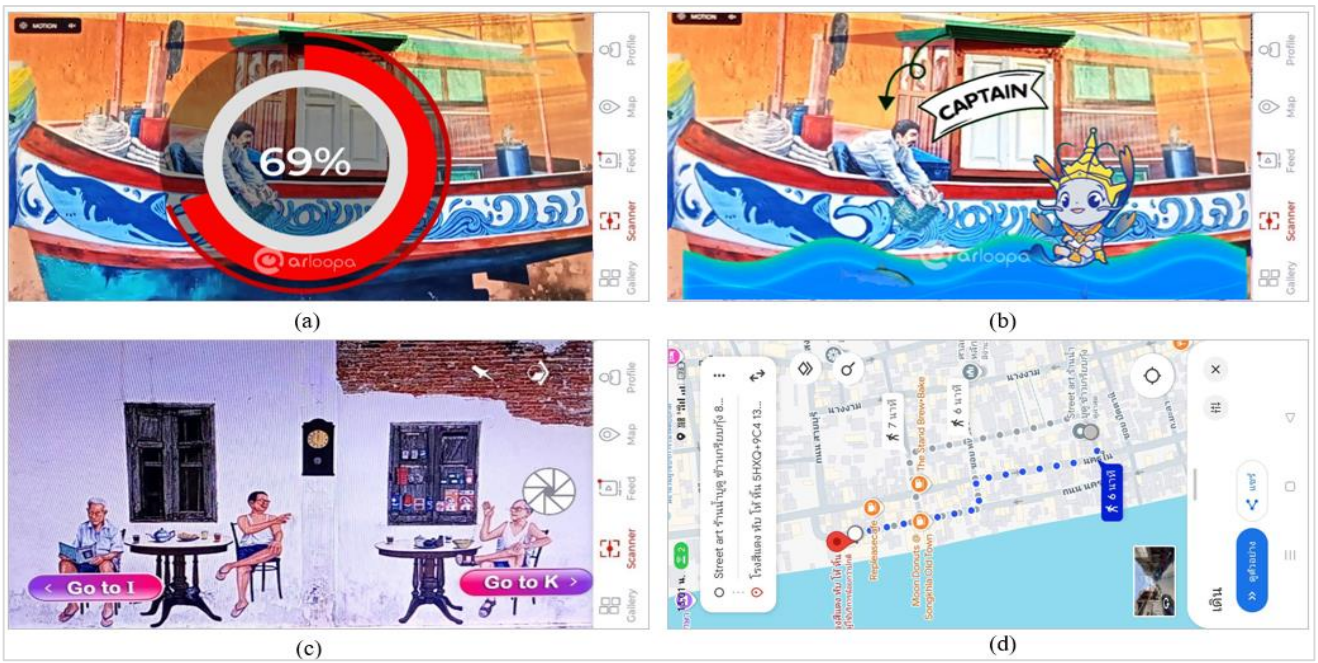

Figure 3. Examples of screen on AR StreetArt@Songkhla (Source: Personal original data)

2. Measurement Development

The research instrument of this study was a survey questionnaire. There were three parts of the assessment: (1) Personal information included gender, age, education, AR experience, AR experience in tourism, and experience of Songkhla Street Art; (2) A five-point Likert scale was used to evaluate tourist satisfaction in terms of usefulness, ease of use, enjoyment, immersive experience, and tourist engagement. The questions in this part were adopted from previous studies where Cronbach's Alpha values were greater than 0.7 (Hien & Trang, 2024; Lim et al., 2024; Moliner-Tena et al., 2024; Soltani Nejad et al., 2024; Xiong & Zhang, 2024; Zhang et al., 2024). Furthermore, the research instrument was sent to three experts in fields of tourism and information technology for assessment of index of item-objective congruence (IOC). The IOC value was 0.87, which indicated the items can clearly measure research objectives (Turner & Carlson, 2003); and (3) Suggestions in an open-ended question.

3. Data Collection and Data Analysis

Data were collected from tourists who visited Songkhla Street Art in Thailand between January and February 2023. The

sampling technique was convenient sampling and sample size was 115 cases. According to Tabachnick and Fidell (2019), the acceptable sample size of five predictors was 90 (Rule of thumb: 50+8P), thus the data collection of this study was reliable for examining predictors. For data analysis, the SmartPLS program was used to analyze collected data in terms of mean, frequency, standard deviation (S.D.), and regression analysis. The research measurement was presented in Table 3.

Table 3. Research Measurement

Item	Measurement	Source
Perceived Usefulness		
PU1	Using AR on my trip can increase my understanding of street art.	Lim et al. (2024), Soltani-Nejad et al. (2024)
PU2	AR can navigate to the nearby street art.	
PU3	AR is very useful for my trip.	
Perceived Ease of Use		
PE1	Using AR is easy.	Lim et al. (2024), Soltani-Nejad et al. (2024), Xiong and Zhang (2024)
PE2	Usage learning of this AR is easy.	
PE3	This AR is easy to increase my technological skill.	
Perceived Enjoyment		
PJ1	During trips, AR can make me have fun.	Soltani-Nejad et al. (2024), Zhang et al. (2024)
PJ2	I enjoy using AR while visiting street art.	
PJ3	AR can help me to be more excited during my trip.	
Impressive Experience		
BI1	I like to be in the virtual reality world using this AR.	Hien and Trang (2024), Zhang et al. (2024)
BI2	The experience of using AR at my destination is truly unforgettable.	
BI3	I am very impressed when I am in the virtual reality world.	
BI4	The travel experience using AR is amazing.	
Tourist Engagement		
TE1	AR engages me to understand street art.	Moliner-Tena et al. (2024), Soltani Nejad et al. (2024)
TE2	AR engages me to visit the other street art in Songkhla.	
TE3	AR engages me to explore nearby AR street art.	
TE4	AR engages me to take photos with Songkhla Street Art.	
Tourist Satisfaction		
TS2	I am happy to use AR StreetArt@Songkhla.	Hien & Trang (2024), Lim et al. (2024)
TS2	I am satisfied to use this AR on my trip.	
TS3	I will suggest this AR to others.	
TS4	In overview, I like to use this AR for my trip to Songkhla Street Art.	

RESULTS

1. Demographic Analysis

For demographic analysis, 115 complete questionnaires were analyzed using descriptive statistics as presented in Figure 4. Most respondents are young females (74.14%), aged 18-25 (84.45%), and primarily have an education level below a bachelor's degree (74.14%). A large portion of volunteers lack experience with AR (65.52%) and AR in tourism (77.59%), though more than half have toured the Songkhla Street Art (62.93%).

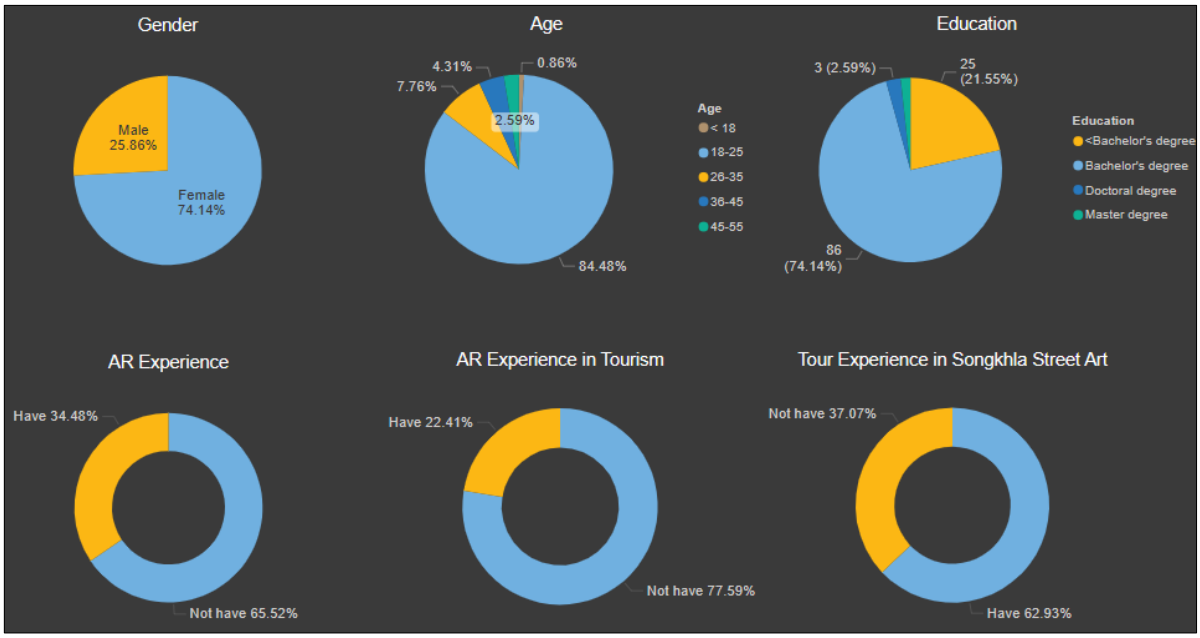

Figure 4. Results of demographic analysis (Source: personal original data)

2. Measurement Analysis

2.1 . Convergent validity and reliability

In Table 4, the results showed that all variables were high factor loadings (> 0.70), indicating strong item-construct relationships. In addition, reliability was strong across all constructs, as evidenced by Cronbach's Alpha and Composite Reliability (CR) values were above 0.70. Convergent validity was demonstrated with high Average Variance Explained (AVE) values, all above the threshold of 0.50, showing that each construct can explain a large portion of variance in its items (Hair et al., 2013).

Table 4. Convergent validity and reliability

Variables	Item	Loading	Cronbach's Alpha	CR (rho_a)	CR (rho_c)	AVE
Perceived usefulness	PU1 PU2 PU3	0.913 0.894 0.880	.876	.877	.924	.802
Perceived ease of use	PE1 PE2 PE3	0.942 0.961 0.940	.943	.943	.963	.898
Perceived enjoyment	PJ1 PJ2 PJ3 PJ4	0.907 0.989 0.919 0.882	.923	.924	.946	.891
Immersive experience	IE1 IE2 IE3 IE4	0.938 0.927 0.932 0.916	.947	.947	.962	.862
Tourist engagement	TE1 TE2 TE3 TE4	0.931 0.927 0.907 0.917	.940	.940	.957	.848
Tourist satisfaction	TS1 TS2 TS3 TS4	0.910 0.946 0.916 0.913	.940	.941	.957	.848

2.2 . Discriminant validity

The results showed that the discriminant validity was satisfied because the bold diagonal values (square roots of AVE) were greater than the correlations between constructs as presented in Table 5. Furthermore, the Variance Inflation Factor (VIF) values were lower than 5, indicating all predictors in the model do not highly overlap measures or it does not have any problem of multicollinearity. In addition, the average scores (Mean) identified the high degree of level in each latent.

Table 5. Discriminant validity and descriptive analysis

Latent	Mean	S.D.	Fornell-Larcker						VIF
			PU	PE	PJ	IE	TE	TS	
Perceived usefulness (PU)	4.30	.823	**.896**						2.44
Perceived ease of use (PE)	4.12	.905	.851	**.948**					4.75
Perceived enjoyment (PJ)	4.20	.855	.843	.815	**.944**				3.51
Immersive experience (IE)	4.14	.958	.794	.798	.867	**.928**			4.26
Tourist engagement (TE)	4.27	.859	.814	.802	.918	.795	**.921**		3.85
Tourist satisfaction (TS)	4.28	.828	.783	.808	.886	.846	.904	**.921**	3.98

3. Hypothesis Testing

For evaluating the structural model, the results revealed the relationships between latent constructs in the context of AR StreetArt@Songkhla as presented in Figure 5. The Standardized Root Mean Square Residual (SRMR) value was 0.044 (< 0.080) and the Normed Fit Index (NFI) value was 0.904 (>0.900), then the proposed model had a good fit (Hair et al., 2013). In addition, the proposed model had higher R^2 values than 0.670 (0.865, 0.687, 0.725, 0.844), indicating model predictive relevance in high level (Hair et al., 2013).

3.1. Direct Effect

Consistent with earlier studies on tourist satisfaction, this study revealed that all direct effects were significant as presented in Table 6. The perception of usefulness (H1: $\beta = -0.088$, $p > 0.05$), ease of use (H2: $\beta = 0.127$, $p > 0.05$), and enjoyment (H3: $\beta = 0.098$, $p > 0.05$) were insignificant directly influenced on tourist satisfaction.

Tourist's perceptions of usefulness (H4: $\beta = 0.422$, $p < 0.001$) and ease of use (H6: $\beta = 0.440$, $p < 0.001$) have a significant positive influence on their immersive experience. In addition, tourists' perception of usefulness had significant positive influence on their ease of use (H5: $\beta = 0.851$, $p < 0.001$). Similarly, tourists' perception of enjoyment had the significant positive influence on tourist engagement (H7: $\beta = 0.919$, $p < 0.001$).

Table 6. Results of direct effects

Hypothesis	β	Sample Mean	S.D.	T-value	*p*-value	Result
H1: PU -> TS	-.088	-.085	.094	.928	.177	Rejected
H2: PE -> TS	.127	.131	.088	1.435	.076	Rejected
H3: PJ -> TS	.095	.087	.156	.609	.271	Rejected
H4: PU -> IE	.422	.419	.116	3.639	.000	Accepted
H5: PE -> PU	.851	.851	.037	22.726	.000	Accepted
H6: PE -> IE	.440	.422	.109	4.032	.000	Accepted
H7: PJ -> TE	.919	.919	.022	40.958	.000	Accepted
H8: IE -> TS	.345	.351	.093	3.717	.006	Accepted
H9: TE -> TS	.630	.622	.095	6.649	.000	Accepted

Specifically, the factors of tourist satisfaction in AR StreetArt@Songkhla context were immersive experience (H8: β = 0.345, $p < 0.001$) and tourist engagement (H9: β = 0.630, $p < 0.01$). Therefore, H4, H5, H6, H7, H8, and H9 were accepted, while H1, H2, H3 were rejected as presented in Figure 5.

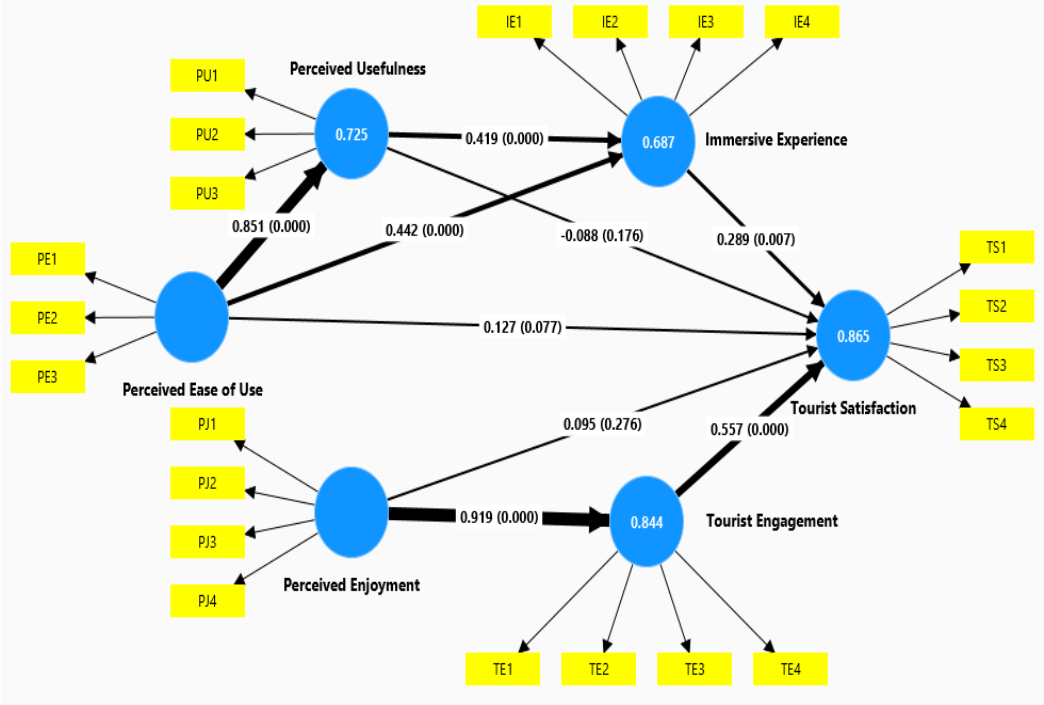

Figure 5. Results of structural analysis

3.2. Indirect effect

The analyzed results of the indirect effect revealed several noteworthy observations as presented in Table 7. The perception of usefulness (β = 0.145, $p < 0.05$) and ease of use (β = 0.152, $p < 0.01$) had the indirect influences on tourist satisfaction through immersive experience, meanwhile perception of enjoyment had the indirect influence on tourist satisfaction through tourist engagement. Furthermore, perceived usefulness had an indirect influence on tourist satisfaction through immersive experience (β = 0.579, $p < 0.001$). Additionally, the perceived ease of use also had an indirect influence on immersive experience through perceived usefulness (β = 0.369, $p < 0.001$).

Table 7. Results of indirect effects

Relationships	β	Sample Mean	S.D.	T-value	*p*-value	Relationship Sig.
PE -> PU -> IE	.369	.361	.104	3.453	.000	Yes
PE -> PU -> TS	-.075	-.069	.080	.932	.176	No
PJ -> TE -> TS	.579	.570	.089	6.502	.000	Yes
PE -> IE -> TS	.152	.152	.051	2.997	.001	Yes
PU -> IE -> TS	.145	.151	.063	2.324	.010	Yes
PE -> PU -> IE -> TS	.124	.129	.043	2.598	.011	Yes

Specifically, the indirect relationship between perceived ease of use and tourist satisfaction were revealed by mediating perceived usefulness through immersive experience of tourist (β = 0.124, $p < 0.05$). In contrast, perceived ease of use did not have any influence on tourist satisfaction through perceived usefulness (β = -0.075, $p > 0.05$).

DISCUSSION

The model presented in the structural equation and indirect effects tables highlights several significant relationships among perceived ease of use (PE), perceived usefulness (PU), perceived enjoyment (PJ), immersive experience (IE), tourist engagement (TE), and tourist satisfaction (TS) in the context of AR based on navigation technology and street art.

Firstly, both PU (H1) and PE (H2) did not have any direct influences on tourist satisfaction, but they had the indirect influence on tourist satisfaction through an immersive experience. These findings were contrast to previous studies in terms of the relationship between PU and tourist satisfaction (Lim et al., 2024; Liu et al., 2023; Nababan et al., 2024), and the relationship between PE and tourist satisfaction (Lim et al., 2024; Nababan et al., 2024; Prakhar et al., 2024). The first possible reason could be the technological differences. Most of the above mentions were not AR technology (website, electric vehicles, and travel application); thus, tourists can perceive usefulness and ease of use directly. Tourists did not want immersive experience in those technologies.

Secondly, this study illustrated that perceived enjoyment was not the direct factor of tourist satisfaction in the context of AR based on navigation (H3). It was contrasted with previous studies in other contexts such as travel applications (Liu et al., 2023) website (Nababan et al., 2024) and Artificial Intelligence (Huang et al., 2024).

Thirdly, the results confirmed that perceived ease of use is related to perceived usefulness (H5). This relationship usually is strong in most technologies such as websites (Nababan et al., 2024) AR and VR in hotels (Lim et al., 2024). Tourists will perceive more usefulness when they can use this technology easily.

Fourthly, the finding indicated the opposite influences between AR technology of this study and the study in electric vehicles (Prakhar et al., 2024). We found perception of usefulness and ease of use (H4 and H6) influenced immersive experiences, meanwhile Prakhar et al. (2024) found immersive experience influenced both perceptions. Possibly, R^2 of this proposed model was higher than those previous studies, thus indicating the better provided constructs and relationships. Further reason, tourists used this AR technology during visiting Songkhla Street Arts which included historical and cultural storytelling. Therefore, the useful contents based on easy of usage can increase tourist's immersion during AR usage.

Fifthly, the role of enjoyment in engagement. This finding confirmed the result of Soltani et al. (2024), which indicated the relationship between PJ and TE (H7). In addition, the pathway from PJ to TE and then to TS highlighted how emotional responses to technology, especially perceived enjoyment, can drive deeper engagement and lead to higher satisfaction. This aligns with the idea that AR technology must appeal to tourists' emotions to create lasting and positive attitudes.

Finally, IE and TE were the key drivers of tourist satisfaction (H8 and H9). Immersive experience is a key factor linking perceived usefulness and ease of use to tourist satisfaction. Likewise, tourist engagement is a key factor linking perceived enjoyment to tourist satisfaction, this finding supported to the results in mobile apps of E-leisure (Soltani et al., 2024). In tourism using AR based on navigation technology, the goal should be to create memorable experiences, and technology needs to offer more than just functionality. It needs to enhance engagement and immersion, transporting tourists into a more enriched experience.

CONCLUSION

The findings supported the notion that in the context of tourism, particularly with the use of AR based on navigation technology in street art, to enhance tourists' experiences and satisfaction, AR technologies should focus on providing immersive platforms including easy-to-use and useful storytelling that engage tourists at both functional and emotional levels. Furthermore, this study revealed the direct and indirect effects in proposed model in the context of AR based on navigation, which will be useful for the other researchers in the similar context.

Finally, the limitations of technology should be considered in future research. As a result of some disagreement between findings and literature reviews, the proposed model may not be explained in some technologies other than AR based on navigation, such as website, travel application, and AR in hotel.

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